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# Inconsistent definitions of labour progress and over-medicalisation cause unnecessary harm during birth

**Nanna Maaløe and colleagues** argue that resource challenges, unclear and outdated clinical practice guidelines, and lack of women's perspectives lead to overdiagnosis and overtreatment of prolonged labour

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Prolonged labour results in considerable morbidity and mortality globally in women and children, as well as risk of caesarean section, uterine rupture, and fetal adverse events.<sup>1</sup> In some instances, labour fails to progress because of fetal malposition or disproportion between the fetus and the woman's pelvis. However, the commonest cause of prolonged labour is inefficient uterine contractions (fig 1).<sup>2</sup> For women with weak uterine contractions, synthetic oxytocin may increase the power of contractions, but there are associated risks, including hyperstimulation, stillbirth, and neonatal complications.<sup>4-10</sup> Furthermore, caesarean section

may still be required, and evidence that synthetic oxytocin reduces the risk of caesarean section is scarce.<sup>5,6</sup> Adding to the challenge, definitions of prolonged labour are inconsistent and tend to overestimate the speed of physiological labour.<sup>11</sup> Furthermore, overdiagnosis of prolonged labour may be caused by detrimental working conditions and routines among healthcare providers in overburdened maternity units.<sup>12-14</sup> Consequently, many women receive oxytocin or caesarean section with the indication of prolonged labour despite it being uncomplicated labour.<sup>11,15-18</sup>

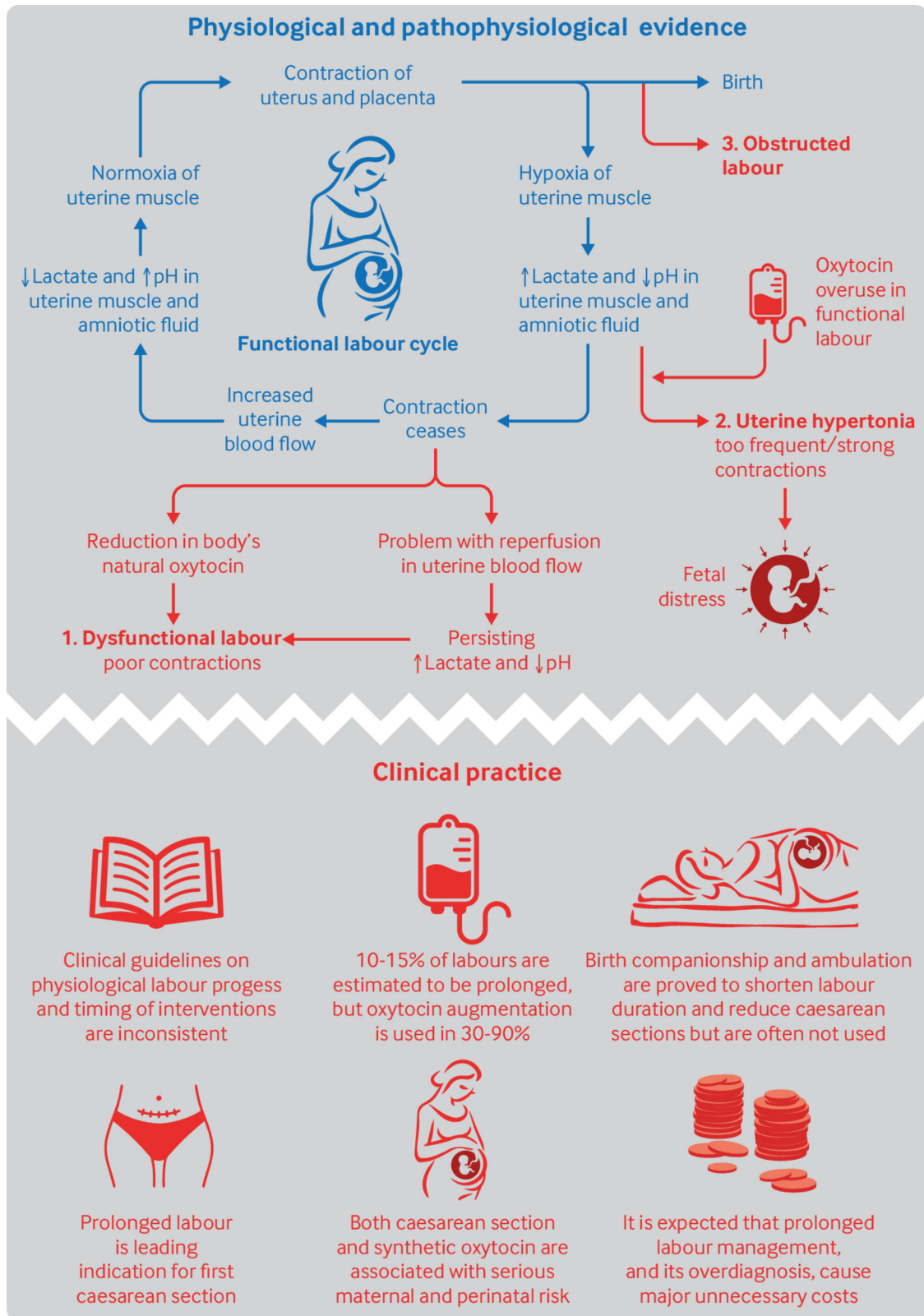


Fig 1 | Physiological and pathophysiological evidence on functional and dysfunctional labour, and discordance with clinical practice. In the functional labour cycle, contractions gradually increase in strength until the cervix is fully dilated and vaginal birth occurs. Relaxation of the uterine muscle between contractions allows for fetal and myometrial re-oxygenation. Possible problems with this natural contraction-relaxation cycle during labour are: (1) Women with true prolonged labour often have either reduced flow of the body's natural oxytocin (eg, because of pain, fear, or mental distress), or increased lactic acid in the capillaries of the uterine muscle. The acidity (lower pH) inhibits calcium ion channels, which in turn decreases contractile strength and limits oxytocin's effect; (2) Too powerful or too frequent contractions—resulting, for example, from

augmentation of labour with synthetic oxytocin—decrease placental perfusion and reduce oxygen flow to the fetus; and (3) In a smaller subgroup of women, progress of labour arrests because of mechanical disproportion between the fetal presenting part and the maternal pelvis despite a functional labour cycle<sup>2-4</sup>

According to synthesis of the evidence on physiological labour progression, prolonged labour occurs in 10-15% of births.<sup>19 20</sup> Yet, cross sectional and systematic review studies indicate that 30-90% of women in hospitals worldwide receive oxytocin to accelerate contractions.<sup>6 16 17</sup> Also, prolonged labour remains the indication for 35%-48% of first caesarean sections, and audits suggest that many of these women in fact had uncomplicated labour progression.<sup>21-25</sup> Prolonged labour, and particularly its overdiagnosis, thereby seems to contribute strongly to the rising global caesarean section rates, which are forecast to reach 28.5% of all births by 2030. This will incur substantial health system costs and add to maternal morbidity and mortality.<sup>15 26-28</sup>

We examine the evidence on defining and managing prolonged labour and propose concrete actions at both global and national levels to prioritise timely, effective, and safe management.

### Conflicting definitions of prolonged labour

Management of labour has for decades been guided by information recorded on a partogram, which was adopted by the World Health Organization in the 1990s.<sup>29</sup> This paper sheet is used for recording labour progression and health status of the woman and baby, and it sets out thresholds for action. Active labour is defined to start at 4 cm cervical dilatation, and it assumes labour to be normal if dilatation progresses at a rate of 1 cm per hour or faster until full dilatation (the alert line). The action line is charted parallel to the alert line, but four hours later (fig 2).<sup>30 31</sup>

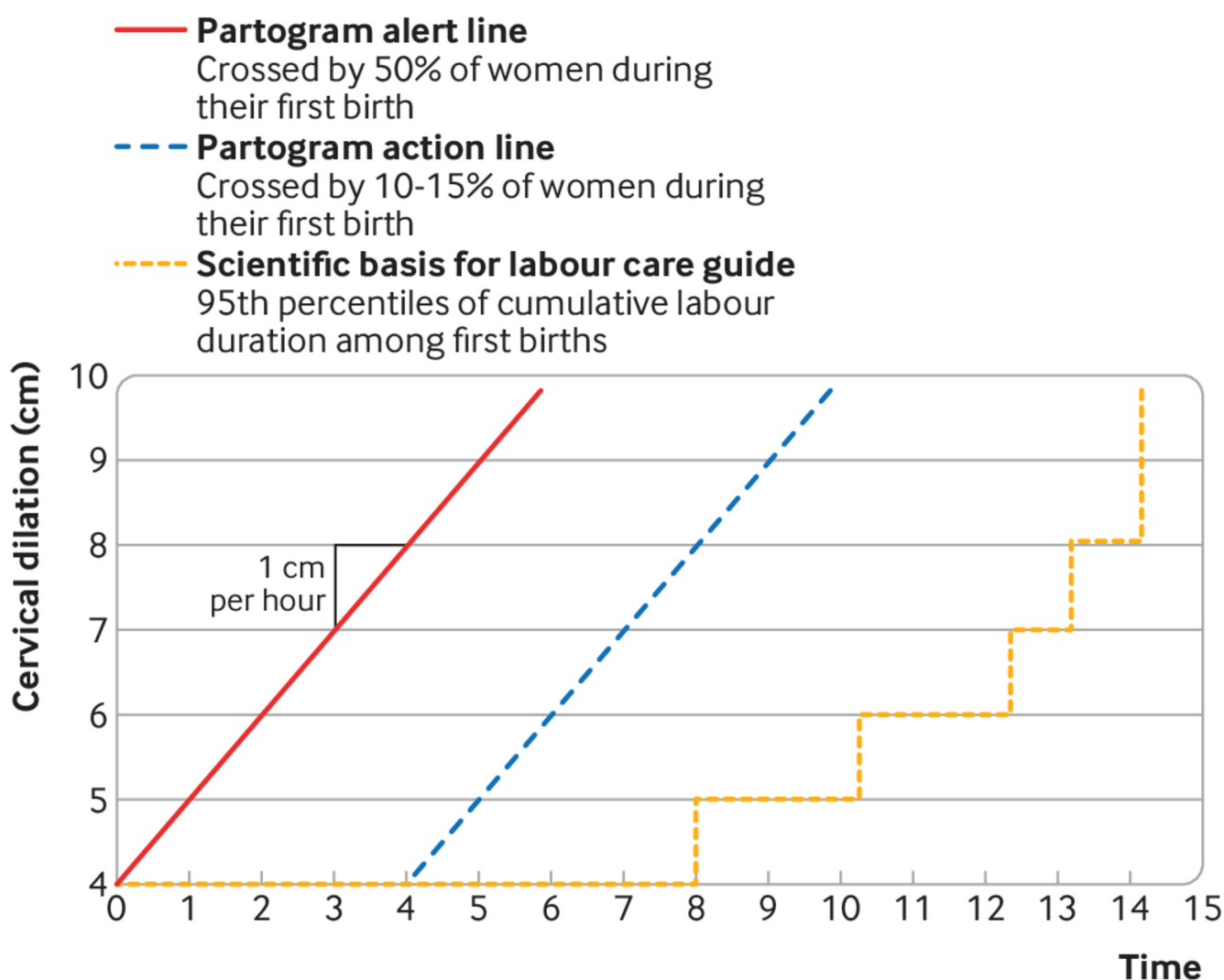


Fig 2 | WHO's thresholds for prolonged first stage of active labour using the partogram and labour care guide

The partogram is widely used. However, large studies from diverse settings over the past 20 years have shown that spontaneous first labours progress much more slowly than 1 cm/hour and that cervical

dilatation is not linear.<sup>19 20</sup> For example, WHO conducted a cohort study of progression of spontaneous labour in Uganda and Nigeria. The study found that around half of 5606 women giving birth for

the first time had cervical dilatation rates slower than 1 cm/hour, while only 15% crossed the action line. Caesarean section was performed in 13.2% of these women.<sup>32</sup>

In 2020, WHO released the labour care guide to replace the partogram. It defines prolonged labour more cautiously with a specific threshold for action for each centimetre of cervical dilatation.<sup>33</sup> For example, labour is prolonged at 5 cm of dilatation if cervical dilatation has not progressed to 6 cm within 5 hours (fig 2), and a woman may be in active labour for more than 18 hours and still be considered to be progressing physiologically. Although use of this labour care guide reduces the risk of interventions being performed too soon, it does not provide guidance on recommended clinical management when a woman crosses the threshold for prolonged labour.<sup>33 34</sup> Furthermore, while WHO has pushed for its use since 2020, a randomised trial of its potential effects has not provided results yet. Evidence is lacking on the physical, mental, and health system consequences of potentially much extended labour durations.<sup>34-36</sup>

Moreover, global, national, and facility based clinical practice guidelines vary widely in terms of their recommendations for diagnosing and managing prolonged labour and, generally, a combination of positive perceptions and habitual use of oxytocin among staff may drive its continued overuse.<sup>11 37 38 13 16 17 39</sup> For instance, the 2021 International Classification of Diseases still defines prolonged labour as slower than 1 cm/hour,<sup>40</sup> which is in line with the partogram from the 1990s rather than evidence from the past 20 years of labour progression studies.<sup>19 20</sup> This has resulted in unclear thresholds for interventions with synthetic oxytocin.<sup>16-18</sup>

### Unknowns regarding synthetic oxytocin for labour augmentation

Synthetic oxytocin gained regulatory approval for use in augmentation of labour in many high income countries in the 1950s—when severely prolonged labour was still a big contributor to maternal mortality. In addition to synthetic oxytocin's lifesaving role in treating postpartum haemorrhage, its capacity to boost contractions was welcomed.<sup>41</sup> Synthetic oxytocin was, and often still is, considered equivalent to the body's natural oxytocin, and it is still often perceived that faster labours are preferable. However, intravenous, synthetic oxytocin tends to be administered at higher levels than endogenous oxytocin and control of levels is less sensitive. A specific dose may therefore have no effect in some women and produce too frequent contractions in others.<sup>41 42</sup>

Concerning actual effects of augmenting labour with synthetic oxytocin, it has been shown to reduce length of labour by about two hours compared with no oxytocin or placebo in low risk women in the first stage of spontaneous labour at term.<sup>5</sup> However, augmentation with oxytocin has not been shown to reduce caesarean sections, which was its core purpose when first introduced.<sup>5 6</sup> On the contrary, two observational studies have indicated that reducing use of oxytocin may in fact reduce caesarean section rates. A 2015 Norwegian study assessed 20 227 women with singleton cephalic pregnancies  $\geq 37$  weeks' gestation in spontaneous or induced labour who had no previous caesarean section. After implementing a protocol recommending more judicious use of oxytocin, the study reported a reduction in use from 34.9% to 23.1% and caesarean sections reduced from 6.9% to 5.3%, including those for fetal distress, which fell from 3.2 to 2.0%. Simultaneously, the proportion of neonates with an umbilical cord pH $<7$  decreased from 4.7% to 3.2%, the proportion of women in active labour for more than 12 hours increased from 4.4% to 8.5%, and the rate of severe postpartum haemorrhage increased from 2.6% to 3.7%.<sup>43</sup> Similarly,

a 2018 before and after study from a Tanzanian hospital evaluated an intervention where oxytocin was restricted to women crossing the partogram action line (fig 2) and found that overall oxytocin use for augmentation reduced from 22.3% to 12.1%. Caesarean rates did not change significantly and stillbirths reduced from 5.9% to 3.9%.<sup>44</sup>

The above studies are, however, all observational and not designed to assess the effect of oxytocin on perinatal outcomes. Oxytocin's effect on caesarean section rates remains unclear. A 2013 Cochrane meta-analysis identified only three randomised trials comparing synthetic oxytocin with no oxytocin or placebo in low risk pregnant women with slow progress during the first stage of spontaneous labour at term (37-42 weeks' gestation, singleton fetus in cephalic presentation). These trials were conducted in Thailand, Argentina, and the US during 1981-96 among a total of 239 women. They were underpowered, but found no difference in caesarean section rates among women with or without oxytocin for labour augmentation.<sup>5</sup> No similar trials have been done since then.<sup>5 6</sup> However, the Cochrane meta-analysis also included five studies among 1200 women assessing early versus delayed use of oxytocin for augmentation (differing definitions). In this group, no change was found in caesarean section rates when comparing early and late use, but there was a significant increase in fetal heart changes in the early use group.<sup>5</sup>

The Cochrane meta-analysis was underpowered to assess more severe neonatal outcomes. However, observational studies of both primiparous and multiparous women from high income countries have found associations between oxytocin and adverse neonatal outcomes, including low Apgar score, acidaemia, and neonatal encephalopathy.<sup>7-9</sup> For example, a systematic review and meta-analysis published in 2021 included a total of 24 208 women giving birth at or beyond 36 weeks of gestation and found oxytocin augmentation to be associated with a 2.19 higher odds of neonatal encephalopathy.<sup>7</sup> Furthermore, our 2022 systematic review and meta-analysis of studies from low and lower middle income countries found associations between oxytocin for labour augmentation and neonatal resuscitation, stillbirth, and day 1 neonatal mortality. We found few studies assessing associations between oxytocin augmentation and caesarean section or uterine rupture, and no randomised controlled trials.<sup>6</sup>

Thus, while oxytocin might help some women with prolonged labour, there are also serious drawbacks and harms associated with its use, which deserve more careful and critical evaluation. Global clinical practice guidelines not only lack clear indications for timely administration of oxytocin for augmentation, but they also provide insufficient information about possible adverse effects to guide clinical decision making and informed consent.<sup>11 38 39</sup>

### Taking women's voices into account

Although some studies show that women who have longer labours tend to report more negative childbirth experiences, focusing solely on shorter labour overlooks that oxytocin augmentation itself may lead to negative childbirth experiences. A qualitative review was conducted of 25 studies from 14 middle and high income countries examining women's experiences with oxytocin augmentation. Here, women indicated that decisions to augment labour are often made without their involvement and that oxytocin is routinely administered without their informed consent.<sup>45</sup> This happens against a background of many women believing that oxytocin augmented labour is more painful. Notably, this is aligned with synthetic oxytocin's lack of analgesic effects, which differs from endogenous oxytocin.<sup>45 42</sup> Conversely, a 2013 qualitative study

among 140 community members in India's Karnataka state, including women who had recently given birth and health providers, reported that high value was placed on pain during labour. This fostered a demand for oxytocin augmentation, often despite awareness of risks.<sup>46</sup>

These contrasting perceptions show the importance of taking women's views into account, both through informed choices in the clinic and through co-creating clinical practice guidelines with the women.<sup>38 45</sup> For instance, UK guidelines on intrapartum care, by the National Institute for Health and Care Excellence, stress that it must be explained to labouring women that oxytocin augmentation "will bring forward the time of birth but will not influence the mode of birth or other outcomes."<sup>47</sup> The part about birth outcomes, however, contradicts the evidence on oxytocin's associations with adverse perinatal outcomes and may affect women's choices.<sup>5-9</sup> Current WHO guidelines, on the other hand, set out the risks of adverse birth outcomes associated with oxytocin augmentation, but do not mention the lack of evidence regarding effect on mode of birth.<sup>31 34</sup>

### Searching for new treatments for prolonged labour

Evidence is growing on how to promote the release and effectiveness of natural oxytocin during childbirth.<sup>42</sup> In particular, fear of childbirth and mental distress from pain, unfamiliar surroundings, and lack of support are associated with longer duration of labour. Meanwhile, continuous birth support, even by a person with modest training, and mobile, upright positions during the first stage of labour have each been shown to improve labour progress, decrease analgesia use, and reduce risks of caesarean section and adverse neonatal outcomes.<sup>48 49</sup> However, inside the world's hospitals, birth

companionship remains far from universal, and most women still labour while lying in hospital beds.<sup>49 36 50</sup>

Additionally, recent studies have shown that women with prolonged labour often have considerably increased lactate levels in the uterine muscle. This lower pH reduces contractions and causes both natural and synthetic oxytocin to be less effective (fig 1).<sup>51 52</sup> Two independent randomised controlled trials from 2017 and 2021, one of 200 Swedish women and the other of 142 Egyptian women with prolonged labour, found that treating prolonged labour with oral bicarbonate followed by oxytocin significantly increased vaginal birth.<sup>53 54</sup> The use of such inexpensive, orally administered, well tolerated treatment to enhance the effectiveness of endogenous oxytocin and avoid intervention in labour could potentially improve health outcomes substantially and larger, and confirmatory, trials are needed.<sup>27</sup>

### Towards timely, safe, and respectful care everywhere

Prolonged labour is not easy to diagnose, and oxytocin might help some women with prolonged labour but not others. However, it is evident that there is systemic overuse of synthetic oxytocin for augmenting labour and of caesarean sections. The risks of preventable caesarean sections and oxytocin augmentation are established,<sup>5 6 26-28 55</sup> and so are the benefits of continuous support and mobility during labour and the fact that physiological labour takes time.<sup>19 20 48 49</sup> However, inconsistent and outdated guidelines and clinical practices show alarming delays in adapting to established evidence. Together with persistent gaps in research and research funding for women's health, this delay denies women their right to the highest attainable standard of health.<sup>56</sup> To address these urgent problems surrounding prolonged labour, three concurrent actions are essential (table 1).

Table 1 | Actions for timely, safe, and respectful treatment of prolonged labour

Goal	Global	National
Conducive maternity units	Allocate sufficient funding to support national childbirth programmes Invest in implementation research on how to close gap between evidence and practice Invest in research on women's preferences during childbirth	Strengthen resources in maternity units to allow for physiological, spontaneous labour progress Scale up proved interventions for prolonged labour such as birth companions and ambulation Invite women and frontline health providers to contribute to these actions
Safe and respectful clinical practice guidelines for labour progression	Harmonise definitions of prolonged labour Co-create and pilot clinical guidelines that take scientific evidence and women's voices into account Support adaptations for regional, national, and sub-national context	Prioritise resources for context sensitive adaption of clinical practice guidelines together with women and healthcare workers Co-create implementation strategies for clinical guidelines Conduct post-implementation evaluations of the effects, including potential adverse effects, of the guidelines
High quality research into causes and prevention of prolonged labour	Invest in basic and clinical research into biology and pathophysiology of labour, and the benefits and harms of potential interventions for prolonged labour (such as oxytocin and bicarbonate)	Ensure robust routine data on prolonged labour, use of synthetic oxytocin for augmentation, and rates of and indications for caesarean section

Firstly, resources must be prioritised to ensure safe birth environments that support and protect physiological labour progression. This low cost and low technology approach of giving women time to progress, while closely monitoring safety and wellbeing, must be possible in all maternity units. It is, however, increasingly challenged by hospital congestion and the crisis in human resources for healthcare. Historically, the morbidity toll of prolonged labour has been on women in rural, resource constrained settings receiving interventions "too little, too late."<sup>30</sup> Although this may still be true for some women living rurally, interventions now often happen "too much, too soon" in urban and overburdened maternity units lacking empathetic designs.<sup>57-59</sup> For instance, a

survey among 204 Swedish midwives found that excessive oxytocin use for augmentation was driven by congestion and high workload rather than individual women's needs.<sup>12 13</sup> Similar findings have been reported in urban studies in Egypt<sup>60</sup> and Tanzania (authors' unpublished data). For example, empathetic co-design of the architecture and structure of maternity units, which enables designers to view units from the viewpoint of women and healthcare providers, has potential to improve the quality and experience of childbirth. This was the approach in a childbirth project in Zanzibar resulting in the redesign of the space to maintain the privacy of women moving to the delivery room and the introduction of birthing stools.<sup>61</sup>

Secondly, the global health community must establish clear and standardised criteria for diagnosing prolonged labour. Also, they must provide well tested, precise guidance for its timely and safe management across different care contexts.<sup>38</sup> WHO's efforts are welcome,<sup>34</sup> but its guidelines, for example, lack clarity on indications for oxytocin augmentation, dosages, and risks. Furthermore, WHO's current guidelines have been disseminated globally before pilot testing or timely post-implementation evaluation of effects, including unintended harms.<sup>38</sup> Moreover, women and frontline healthcare providers must be sensitively included during creation and local adaptation of guidelines.<sup>38 45</sup>

Lastly, research must be intensified on the pathophysiology of prolonged labour, on promising new treatments, and on how to bridge the evidence-practice gap (fig 1).<sup>56</sup> Improved understanding of causes of prolonged labour may lead to effective, individualised management.<sup>2 3</sup> Also, after 70 years of use, a thorough understanding of the potential effects of oxytocin augmentation when administered restrictively, rather than near routinely, is long overdue.

### Key messages

- Globally, prolonged labour is overdiagnosed and overtreated with oxytocin and caesarean section
- Consequently, many women are exposed to avoidable health risks, including uterine hyperstimulation, surgical risks, and adverse perinatal outcomes
- Clinical practice guidelines provide outdated, inconsistent, and unclear definitions of prolonged labour with an unbalanced view on treatment risks and benefits
- Maternity units are needed that enable physiological labour progression through caring, continual support, and ambulation
- Research and clinical practice guidelines that reflect latest evidence, context, and women's perspectives are also required to reduce unnecessary harms

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**Public and patient involvement:** Five of the authors have given birth and six work within maternity care in Tanzania, Denmark, and the Netherlands. We also included perspectives from qualitative studies on women's and healthcare providers' perceptions of prolonged labour and its clinical management.

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